Reference Manual

PlantPAx
Process Automation System

Rockwell Automation Library of Process Objects: Condition Gate Delay (P_Gate)

Version 3.1

Allen-Bradley • Rockwell Software

Rockwell Automation

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

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	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.
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IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

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	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.
	ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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Notes:

This document is updated throughout for version 3.1 of the Rockwell Automation Library of Process Objects. Changes for this revision are marked by change bars shown in the right margin.

Software Compatibility and Content Revision

Table 1 - Summary of Changes

Topic	Page
Changed title from 'PlantPAx® Library of Process Objects' to 'Rockwell Automation Library of Process Objects'	Front Cover
Changed version of Rockwell Automation Library of Process Objects from 3.0 to 3.1	5, 8, 9
Changed references to Knowledgebase Answer ID 62682 to Product Compatibility and Download Center	5
Visualization Files: added Important note concerning the order files are to be imported	9
Output Parameters table: added 'Out_' and 'Err_' parameter descriptions to bullet list	11
Operations - added Modes, Alarms, and Simulation sections	12
Faceplate - added information about content of faceplate title bar.	15

For the latest compatible software information and to download the Rockwell Automation Library of Process Objects, see the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

For general library considerations, see Rockwell Automation Library of Process Objects, publication PROCES-RM002.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
PlantPAx Process Automation System Selection Guide, publication PROCES-SG001	Provides information to assist with equipment procurement for your PlantPAx system.
PlantPAx Process Automation System Reference Manual, publication PROCES-RM001	Provides characterized recommendations for implementing your PlantPAx system.
Rockwell Automation Library of Process Objects, publication PROCES-RM002	Provides general considerations for the PlantPAx system library of process objects.
FactoryTalk® View Machine Edition User Manual, publication VIEWME-UM004	Provides details on how to use this software package for creating an automation application.
FactoryTalk View Site Edition User Manual, publication VIEWSE-UM006	Provides details on how to use this software package for developing and running human-machine interface (HMI) applications that can involve multiple users and servers, distributed over a network.
Logix5000™ Controllers Add-On Instructions Programming Manual, publication 1756-PM010	Provides information for designing, configuring, and programming Add-On Instructions.

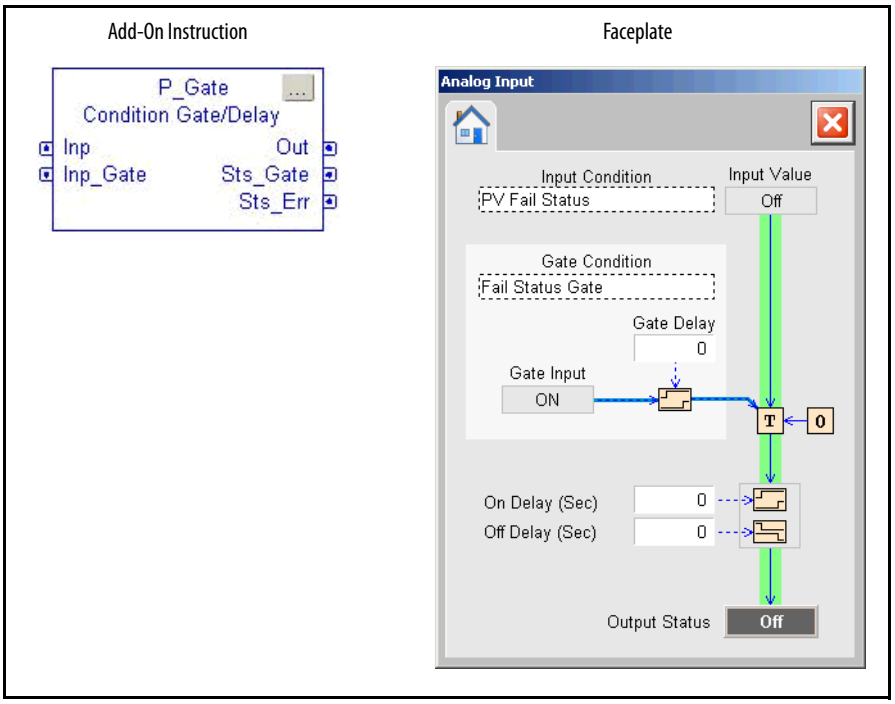
You can view or download publications at http:/www.rockwellautomation.com/literature/. To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

Condition Gate Delay (P_Gate)

The P_Gate (Condition Gate Delay) Add-On Instruction provides a 'gate' for a discrete signal and provides on-delay and off-delay timing for the gated signal.

P_Gate is used within P_DIn, all Analog inputs, and P_PIDE for threshold and target disagree status processing.

When the gate input is true, the input is passed through to the output with on-delay and off-delay timing applied. When the gate input is false, the output is kept off (the off-delay still applies).



Guidelines

This instruction is integrated with the following Rockwell Automation Library Objects:

- Basic Analog Input (P_AIn)
- Advanced Analog Input (P_AInAdv)
- Dual Sensor Analog Input (P_AInDual)
- Multiple Analog Input (P_AInMulti)
- Discrete Input Object (P_DIn)
- Enhanced PID (P_PIDE)

Functional Description

The primary operations of the P_Gate Add-On Instruction and its faceplate are:

- Provides gate input to turn on and off input monitoring
- Provides Gate delay to define the time the gate input must be on for status outputs to be enabled
- Provides on and off delays for the status output
- Provides configurable strings for gate and status condition descriptions
- Provides faceplate for setup of gate delay, on delay, off delay, and strings

Required Files

Add-On Instructions are reusable code objects that contain encapsulated logic that can streamline implementing your system. This lets you create your own instruction set for programming logic as a supplement to the instruction set provided natively in the ControlLogix® firmware. An Add-On Instruction is defined once in each controller project, and can be instantiated multiple times in your application code as needed.

Controller File

The P_Gate_3_1-**00**_AOI.L5X Add-On Instruction must be imported into the controller project to be used in the controller configuration. The service release number (boldfaced) can change as service revisions are created.

Visualization Files

The following files for this Add-On Instruction can be downloaded from the Product Compatibility and Download Center at http://www.rockwellautomation.com/rockwellautomation/support/pcdc.page.

IMPORTANT Files must be imported in the following order: image files, then global object files, and then graphic files. This order is required to properly configure the visualization files.

Table 2 - P_Gate Visualization File Types

Application Type	File Type	FactoryTalk View SE Software	FactoryTalk View ME Software	Description
Graphics - Displays	GFX	(RA-BAS) P_Gate-Faceplate Objects	(RA-BAS-ME) P_Gate-Faceplate Objects	The faceplate display used for the object.
		(RA-BAS) Common-AnalogEdit	N/A	Faceplate used for analog input data entry. The FactoryTalk View ME faceplates use the native analog input data entry so no file is required.
Graphics - Global Objects	GGFX	(RA-BAS) Common Faceplate Objects	(RA-BAS-ME) Common Faceplate Objects	Common global objects used on all Process Object faceplates.
Graphics - Images	PNG	All .png files in the images folder	All .png files in the images folder	These are the common icons used in the global objects and faceplates for all Process Objects. When PNG graphic formats are imported, they are renamed like a BMP file but retain a PNG format.
HMI Tags	CSV	N/A	FTVME_PlantPAxLib_Tags_3_1_**00**.CSV(1)	These tags must be imported into the FactoryTalk View ME project to support switching tabs on any Process Object faceplate.

(1) The service release number (boldfaced) can change as service revisions are created.

Controller Code

This section describes the parameter references for this Add-On Instruction.

Condition Gate Delay Input Structure

Input parameters include the following:

- Input data elements (Inp_) are typically used to connect field inputs from I/O modules or signals from other objects.
- Configuration data elements (Cfg_) are used to set configurable capabilities and features of the instruction.

Table 3 - P_Gate Input Parameters

Input Parameter	Data Type	Default	Description
EnableIn	BOOL	1	**Ladder Diagram:** If the rung-in condition is true, the instruction's Logic routine executes. If the rung-in condition is false, the instruction's EnableInFalse routine executes. **Function Block Diagram:** If true, or not connected, the instruction's Logic routine executes. If the parameter is exposed as a pin and wired, and the pin is false, the instruction's EnableInFalse routine executes. **Structured Text:** No effect. The instruction's Logic routine executes.
Inp	BOOL	0	Input Condition. This is the result of threshold comparison usually performed by the parent object.
Inp_Gate	BOOL	1	Gate input used for status detection. When set to 1, input monitoring is enabled. When enabled, on delay and off delay times are applied after the gate delay time. When set to 0, input detection is disabled and the status output is forced off.
Cfg_GateDly	DINT	0	The amount of time (in seconds) the gate input must be turned on for status outputs to be enabled. On delays and off delays are applied to the input after the gate delay is completed.
Cfg_OnDly	DINT	0	Determines the minimum time (in seconds) the input must remain on for the status to be set. On-delay times are typically used to avoid unnecessary status indication or alarm when a value only briefly overshoots its threshold.
Cfg_OffDly	DINT	0	Determines the amount of time (in seconds) the input must be cleared to clear the status. Off delay times are typically used to reduce chattering status indicators or alarms.

Condition Gate Delay Output Structure

Output parameters include the following:

- Output data elements (Out_) are the primary outputs of the instruction, typically used by hardware output modules; however, they can be used by other application logic.
- Status data elements (Sts_) are bit outputs of the instruction for use by the HMI. Status bits also can be used by other application logic.
- Error data elements (Err_) are outputs of the instruction that indicate a particular configuration error. If any Err_ bit is set, then the Sts_Err configuration error summary status is set and the Invalid Configuration indicator is displayed on the HMI.

Table 4 - P_Gate Output Parameters

Output Parameter	Data Type	Description
EnableOut	BOOL	Enable Output: The EnableOut signal is not manipulated by this instruction. Its output state always reflects EnableIn input state.
Out	BOOL	Output after On Delay, Off Delay, enabled by Gate.
Sts_Gate	BOOL	1 = Gate Delay done, Output is enabled.
Sts_Err	BOOL	1 = Error in Config (see detail Err_ bits for reason), display icon.
Err_Timer	BOOL	1 = Error in Config: On Delay, Off Delay, Gate Delay Time Invalid (use 0 …2,147,483 seconds).
P_Gate	BOOL	Unique parameter name for auto-discovery.

Condition Gate Delay Local Configuration Tags

Configuration parameters that are arrayed, string, or structure data types cannot be configured as parameters for Add-On Instructions. Configuration parameters of these types appear as local tags to the Add-On Instruction. Local tags can be configured through the HMI faceplates or in RSLogix™ 5000 software by opening the instruction logic of the Add-On Instruction instance and then opening the Data Monitor on a local tag. These parameters cannot be modified by using controller logic or RSLogix 5000 software export/import functionality.

Table 5 - P_Gate Input Local Configuration Tags

Tag Name	Data Type	Default	Description
Cfg_GateCond	STRING_20	'Gating Condition'	Gate input description.
Cfg_InpCond	STRING_20	'Input Condition'	Input condition description.

Operations

This section describes the primary operations for Add-On Instruction.

Modes

The P_Gate Add-On Instruction does not have modes and does not contain a P_Mode instruction instance.

Alarms

The P_Gate Add-On Instruction does not generate any alarms. In many applications, status bits from P_AIn Analog Input or P_DIn Discrete Input instructions are sent to the P_Gate inputs, and the output of P_Gate is the input to a P_Alarm instruction.

ATTENTION: Status bits are normally used as permissive conditions. Use alarm bits as permissive conditions only if you intend that the permissive condition be ignored when the corresponding alarm is inhibited.

Simulation

The P_Gate Add-On Add-On Instruction does not have a Simulation capability.

Execution

The following table explains the handling of instruction execution conditions

Table 6 - P_Gate Execution

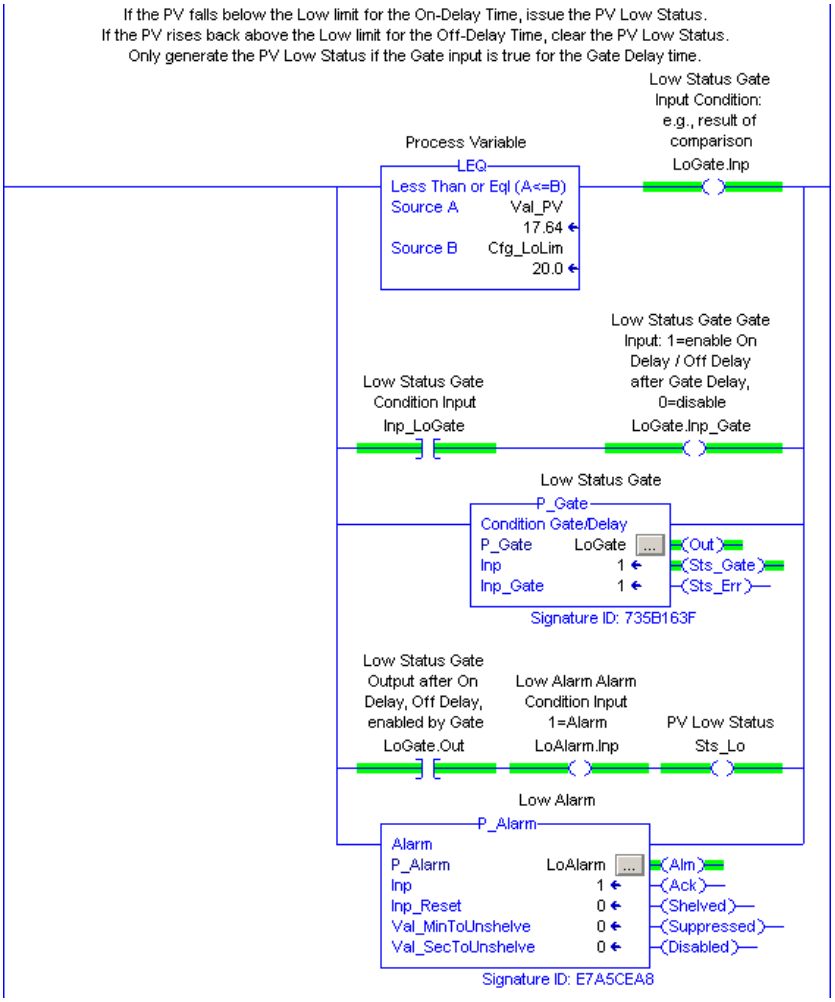
Condition	Description
EnableIn False (false rung)	Processing for EnableIn False is handled the same as the main logic routine except that the state of Inp is inverted. This allows the P_Gate Add-On Instruction in a Ladder Diagram instance to have its condition input mapped by using the rung condition instead of separate mapping logic. Be sure the Inp parameter is set to 1 (its default value) when using rung condition mapping. Refer to 'Implementation by using the EnableIn False Feature' for details. **IMPORTANT:** Only the condition input 'Inp' is inverted when EnableIn is false. The gate input 'Inp_Gate' must still be mapped.
Powerup (prescan, first scan)	During Prescan, the Inp_Gate input is set to 1 to ensure the condition input Inp is processed with on-delay and off-delay timing if the Inp_Gate pin becomes unconnected or un-referenced.
Postscan (SFC Transition)	No SFC postscan logic is provided.

Refer to the Logix5000 Controllers Add-On Instructions Programming Manual, publication 1756-PM010, for more information.

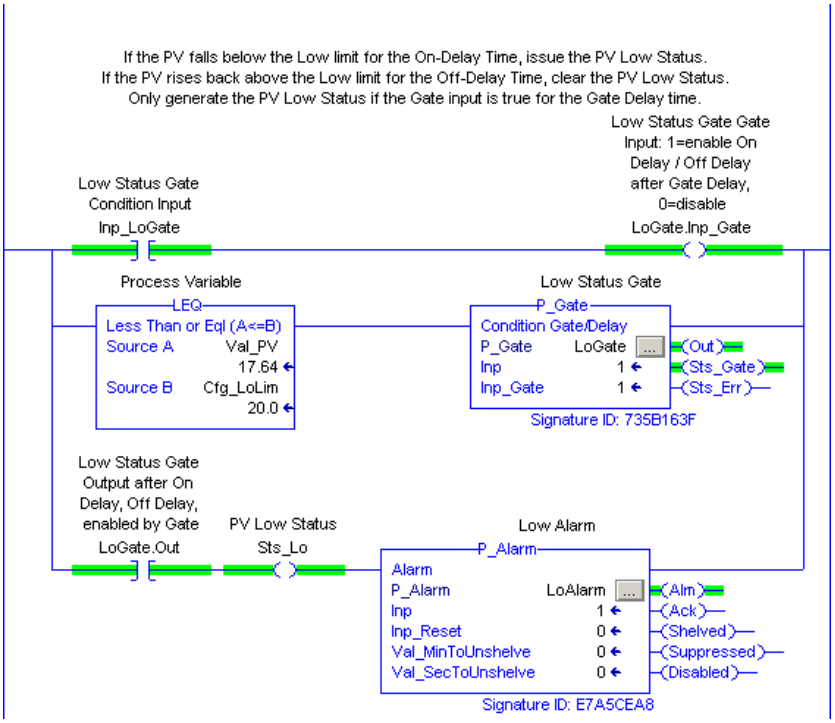
Implementation by Using the EnableIn False Feature

The P_Gate instruction can be used in a Ladder Diagram routine with the input condition carried by the Rung-In state instead of being mapped by separate logic, such as an XIC/OTE branch.

The following illustration shows normal implementation with the condition input and gate input mapped to the P_Gate instance by logic, in this case on the branches immediately before the instance.



The following illustration shows the EnableIn False implementation, with the condition input mapped by using the Rung-In state. (It also shows Rung-In mapping for the P_Alarm instruction.)



Note that whether or not you map the P_Gate instruction's condition input by using the Rung-In state, the Inp_Gate signal must still be mapped by logic. Only the condition input Inp follows the Rung-In state.

The Rung-In condition determines whether the Add-On Instruction's normal code ('Logic' Routine) is executed or its EnableIn False code ('EnableInFalse' Routine). The two routines use identical code, except that in the EnableInFalse Routine all references to Inp are inverted.

When using the Rung-In mapping method, be sure to set Inp to 1 (its default value). Then, when the rung is TRUE, Inp (which is 1) is treated as TRUE. When the rung is FALSE, Inp (which is still 1) is treated as FALSE (inverted).

Display Elements

The P_Gate instruction is used within other device instructions to provide status and alarm timing functions. There are no dedicated display elements for this instruction. The faceplate is called from the containing instruction faceplate.

Faceplate

Some device faceplates include navigation to P_Gate. The P_Gate faceplate title bar contains the value of the local configuration tag (Cfg_Desc) of the containing Add-On Instruction from which P_Gate was called.

For example, if the P_Gate Operator faceplate were opened by clicking on a threshold name in P_AInAdv, the description displayed in the P_Gate faceplate title bar is the same as the description used in P_AInAdv. (See the P_Gate faceplate on page 16.)

The faceplate provides the means for operators, maintenance personnel, engineers, and others to interact with the P_Gate instruction instance. When a given input is restricted via FactoryTalk View security, the required user Security Code letter is shown in the tables that follow.

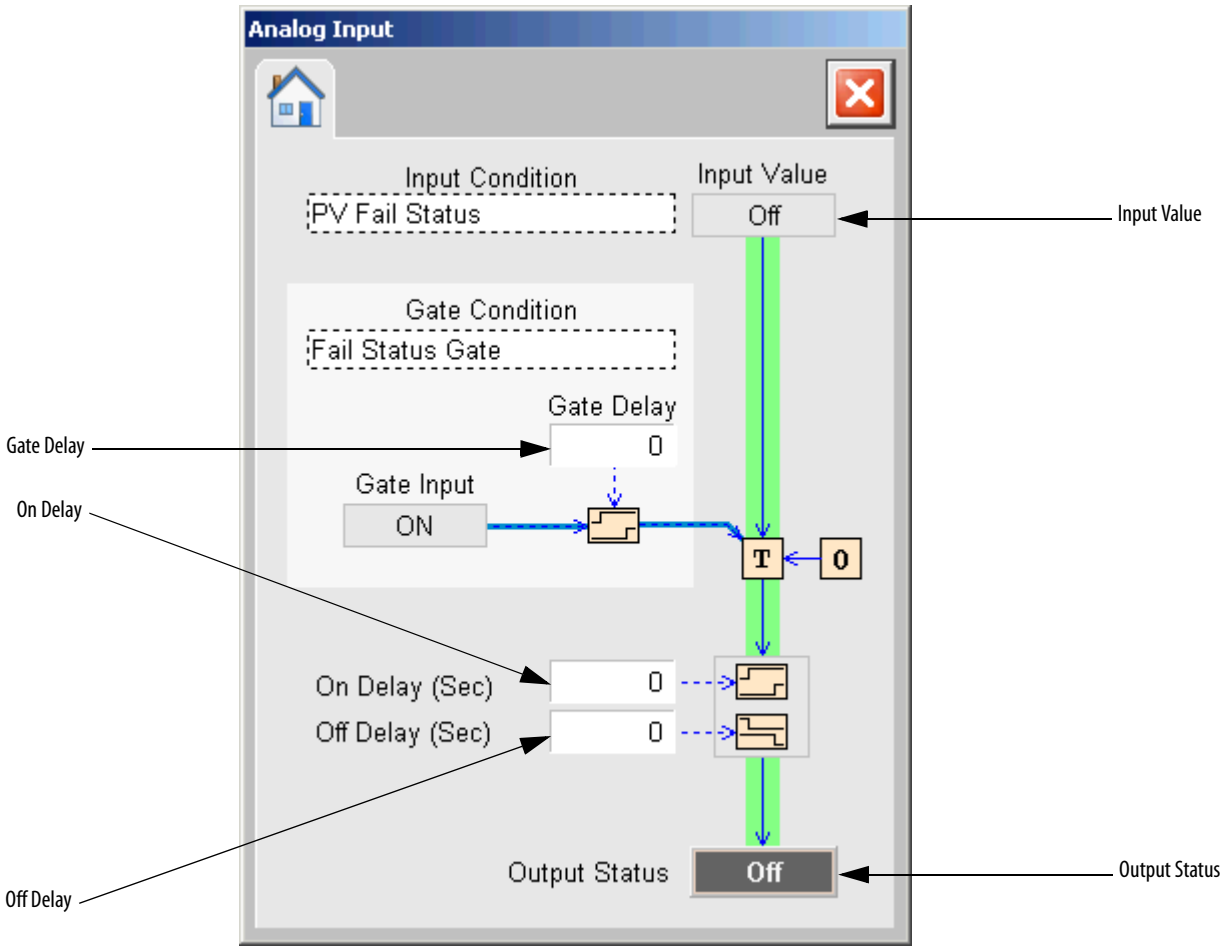
Operator Tab

The Faceplate initially opens to the Operator ('Home') Tab. From here, an operator can monitor the device status.

The Operator tab shows the following information:

- Indictors that show the current Input Value and Output Status
- Gate Input status indicator

The figure below shows the Operator tab.



The following table lists the functions on the Operator tab.

Table 7 - Operator Tab Descriptions

Function	Action	Security Required
Input Condition	Type the text for the Input Condition. This text appears on the Maintenance tab of the faceplate from which the P_Gate faceplate is opened.	Engineering Configuration (code E)
Gate Condition	Type the text for the gate Condition.	
Gate Delay	Type the amount of time (in seconds) the gate input must be turned on for status outputs to be enabled.	Configuration and Tuning Maintenance (Code D)
On Delay	Type the minimum time (in seconds) the input must be true to set the status. On-delay times are typically used to avoid an unnecessary status indication or alarm when a value briefly overshoots its threshold.	
Off Delay	Type the amount of time (in seconds) the input must be cleared clear the status. Off delay times are typically used to reduce chattering status indicators or alarm.	

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support you can find technical and application notes, sample code, and links to software service packs. You can also visit our Support Center at https://rockwellautomation.custhelp.com/ for software updates, support chats and forums, technical information, FAQs, and to sign up for product notification updates.

In addition, we offer multiple support programs for installation, configuration, and troubleshooting. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/services/online-phone.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in this manual. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/rockwellautomation/support/overview.page, or contact your local Rockwell Automation representative.

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Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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